

**Code: DE22**  
**Time: 3 Hours**

**Subject: INDUSTRIAL ELECTRONICS**  
**Max. Marks: 100**

**NOTE: There are 9 Questions in all.**

**DECEMBER 2007**

- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

**Q.1 Choose the correct or best alternative in the following: (2x10)**

- a. An SCR can be operated
- (A) Only under reverse biased condition.  
 (B) Only under forward biased condition.  
 (C) Both forward & reverse bias conditions.  
 (D) Without biasing.
- b. A 3-phase full wave fully controlled bridge rectifier uses
- (A) 4 SCR's. (B) 6 SCR's.  
 (C) 8 SCR's. (D) 3 SCR's.
- c. According to their connections, inverters are classified as
- (A) Series inverters. (B) Parallel inverters.  
 (C) Bridge inverters. (D) All the above types.
- d. Average output of a dc chopper is given by
- (A)  $V_o = V_{dc} / \text{duty cycle}$  (B)  $V_o = V_{dc} \times \text{duty cycle}$   
 (C)  $V_o = \text{duty cycle} / V_{dc}$  (D) None of these
- e. A cycloconverter is a device which
- (A) Measures frequency of a.c. mains.  
 (B) Converts a.c. of one frequency to a.c. of other frequency.  
 (C) Converts a.c. into d.c.  
 (D) Converts d.c. into a.c.
- f. UJT is used for
- (A) Controlling the power. (B) Triggering a triac.  
 (C) Triggering an SCR. (D) Triggering a Diac.
- g. In dielectric heating process the supply requires
- (A) Low frequency. (B) Very low frequency.  
 (C) High frequency. (D) Very high frequency.
- h. ON and OFF frequency of a chopper depends on
- (A) Applied voltage. (B) The load current.  
 (C) Type of the chopper. (D) Output voltage.
- i. Induction heating is used for

- (A) Melting. (B) Annealing.  
 (C) Forging. (D) All the above.

j. An inverter converts

- (A) A.C. to D.C.  
 (B) D.C. into A.C.  
 (C) A.C. into A.C. of different frequency.  
 (D) None of these

**Answer any FIVE Questions out of EIGHT Questions.  
 Each question carries 16 marks.**

- Q.2** a. Explain the Principle of operation & V-I Characteristics of an SCR. (8)  
 b. Explain Series & Parallel operation of SCR's. (8)
- Q.3** a. Explain the circuit of a three – phase bridge inverter for  $180^\circ$  conduction. Also draw the waveforms. (8)  
 b. A three – phase bridge inverter is fed by a 400 volts battery. The load is star connected and has a resistance of 10 ohms per phase. Find rms load current, power output, and average and rms thyristor current. Assume  $120^\circ$  mode of operation. (8)
- Q.4** a. Explain the circuit of a single-phase fully controlled bridge rectifier. Also draw the waveforms. (8)  
 b. Explain single-phase half wave rectifier with R-L load and without free wheeling diode and also draw the corresponding waveforms. (4+4)
- Q.5** a. Explain the different commutation methods for choppers. (8)  
 b. A chopper supplied by 200 V dc, remains ON for 20 msec. and OFF for 10 msec. Determine the average voltage across the load. (8)
- Q.6** a. On what principle, does the induction heating process carried out. Explain giving a few of its applications. (5+3)  
 b. Explain the process of resistance welding with a suitable diagram. Also give the applications of resistance welding. (6+2)
- Q.7** a. What is meant by thermal loss in dielectric heating? Explain the process of dielectric heating. (4+4)  
 b. Give the classification of inverters and applications of series and parallel inverters. (4+4)
- Q.8** a. Explain the circuit of the single-phase fully controlled rectifier with RL load and with freewheeling diode. What is the function of the diode? Also draw the waveforms. (8)  
 b. How, is induction heating is more advantageous? Give the application of dielectric heating. (4+4)
- Q.9** Write **notes** on:-
- (i) D.C. motor speed control. (4)  
 (ii) Application of choppers. (4)  
 (iii) SCR rating. (8)